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Studies in Renal Denervation.* III. Bacterial Embolism in the Normal and Denervated Kidney.

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Medium sized rabbits were used throughout the experiment. The left kidney was denervated and the right kidney was left intact and used as a control. The rabbits were placed on normal diet.

The kidney was approached through a lumbar incision and denervated according to the method described by Milles, Müller and Petersen,[1] except that the animals were placed under ether anesthesia instead of Nembutal. Some of the animals were allowed to recover for 2 weeks; others for 2 months.

Five cc. of a concentrated suspension of an attenuated culture of *Staphylococcus aureus* in physiological salt solution was injected into the marginal ear vein of each rabbit. The fine clumps of bacterial growth were not broken up when removed from the agar plates and placed into the salt solution, in the hope that embolus formation would thus be favored. This was first tried on unoperated animals to determine the dosage necessary to produce emboli. It had been previously determined that this dosage would kill such rabbits in 4 to 5 days. It was then tried on denervated rabbits and the results indicated that the denervated kidneys contained about half as many emboli as the intact kidney.

The following rabbits were then used to make exact counts of

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[1] Milles, G., Müller, E. F., and Petersen, W. F., PROC. SOC. EXP. BIOL. AND MED., 1931, **28**, 351.

the number of micotic abscesses formed. They were killed on the morning of the fourth day after the bacterial injection by injecting ether into the heart, the kidneys removed and fixed in formalin. Corresponding parts of the kidneys were sectioned serially and examined microscopically. The emboli were counted and the following results were obtained:

Two Week Recovery after sympathectomy of left kidney		Two Month Recovery after sympathectomy of left kidney	
Left	23 emboli	Left 1	24 emboli
Right	174 "	Right 1	72 "
		Left 2	13 "
		Right 2	36 "
		Left 3	120 "
		Right 3	263 "

Obviously the normal kidneys develop more micotic abscesses than the denervated kidneys.

The toxicity associated with the bacterial injection may act directly on the sympathetic nervous system or in the nerve endings of the arterioles or capillaries of the kidney with resulting contraction. This contraction on the normal side may impede the passage of small micotic emboli sufficiently to facilitate their retention in the glomeruli. The denervated kidney with its wider vascular bed and the absence of sympathetic nerve effects may offer freer passage for the emboli.[2] The slowing of the passage through the normal kidney as contrasted to the denervated kidney may permit greater opportunities for lodgement of the emboli in the tortuous capillaries of the glomeruli. These effects may be mediated through the shock effect of the injection and the consequent liberation of epinephrine with resulting action on the intact vasomotor system but having no influence on the denervated kidney.

The denervated kidney, because of its better blood supply may be able to destroy the bacteria that lodge in the kidney. Müller, Petersen and Rieder[3] found that in the presence of a colon bacillemia the intact kidney excreted not only large amounts of albumin, red blood corpuscles and casts but also bacteria in large numbers, while the denervated kidney remained impermeable. The experiments indicate the importance of the relative autonomic tonus in different organs for the lodgement of bacteria and the formation of emboli in bacteremia and sepsis.

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[2] Milles, G., Müller, E. F., and Petersen, W. F., PROC. SOC. EXP. BIOL. AND MED., 1931, **28**, 354, 561.

[3] Müller, E. F., Petersen, W. F., and Rieder, W., *Verh. d. Deut. Gesell. f. inn. Med.*, 1930, **42**, 580.